

indicated during at least twenty years in elementary treatises. Again, although a citizen of Pennsylvania—a State one of whose most remarkable evidences of wealth is the fact that she is the holder of the great anthracite basin and of a portion of the chief bituminous measures—although a resident of Philadelphia, whose principal domestic export is coal, it is assumed that I could overlook the fact that there are vast deposits of coal in North America. It ought, perhaps, to be said in this connection, that the author has wholly misunderstood my observations with respect to the comparative quantities of vegetable product in the carboniferous period and that in which we live. Considering that we do not know the extent of the area of growth in the carboniferous period, nor the length of time consumed in forming the deposits of vegetable matter which make the coal beds; and taking into view solidity as well as size, and the multiplication of individual growths, it is certainly not going very far to say that it is not “patent to all” that the total quantity of vegetable growth upon the earth during a given space of time was greater in the carboniferous than in the present period. I made no affirmative assertion; and in the absence of conclusive proof, I have none to make now. It is enough to indicate the irrelevance of the reasoning employed by the author upon pages 174 and 175.

With respect to the scientific criticism which has occasioned these remarks, it gives me no concern. It, or its equivalent, will be judged by proper persons. It has been in the hands of many whose minds have been disciplined in the best methods of inquiry; and from no quarter had I reason to suspect the existence of dissent until the appearance of the book before us. It is to be hoped that on both sides of the Atlantic there will be cultivated a mutual confidence, which shall prevent misconception of motives; and that hereafter the vigilance which is indispensable to preserve the pursuits of philosophy from unconscious bias, shall not be misconstrued as the intrusion of an unfriendly spirit. *Felix quem faciunt aliena pericula cautum.* In conclusion, I beg to renew the expression of my regret, that any accident should have made me the occasion of pain to a gentleman so deserving of our consideration and friendly esteem as was the author of “The Testimony of the Rocks.” It cannot but enhance the appropriateness of such an expression at this meeting, that beside yourself and your colleague, the other Vice President, who usually preside over the deliberations of the Academy, I see here to night its venerable President, and several other learned members, whose names are familiar to cultivators of the natural sciences in Great Britain.

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May 12th.

Vice President BRIDGES in the Chair.

Communications were received, for publication in the Proceedings, entitled, as follows:

Notes Explanatory of a Map and Section illustrating the Geological structure of the country bordering on the Missouri River, from the mouth of Platte River to Fort Benton, in lat. 47° 30' N. long., 110° 30' W., by F. V. Hayden, M. D.

On the Larva of *Thyreus Abbottii*, by J. P. Kirtland, M. D.

Which as usual were referred to Committees.

Mr. Harris observed, in relation to the specimens of cotton-wood and chips cut by beavers, presented this evening, that they had been obtained by him from the Missouri River, between Fort Union, at the mouth of the Yellowstone, and Fort Clark, at the Mandan Village. He added, that in returning from a trip up the Missouri to the mouth of the Yellowstone, in company with the late J. J. Audubon and party, in the month of September, 1843, our Mackinaw boat was moored for the night on the right bank of the river, under shelter of timber on the bank, which was here about twenty feet above the water at its then 1857.]

rather low stage. Our guide and pilot in descending the river, Prevost, who was an old trapper, hired by Mr. A. at St. Louis for the trip, soon discovered signs of the beaver, and presently a newly constructed beaver-house about one hundred yards above the boat. It was too late to examine the premises, and after cutting wood, building a fire, and cooking our supper, we turned in for the night. Very early in the morning, before breakfasting, we hastened to examine what had been the object of more than one expedition on the Yellowstone, and which had, heretofore, baffled our search. Prevost assured us that the noise and smell of smoke, and cooking from our camp, must have driven the beaver to a place of safety soon after our landing the night before, and that we could only gratify our curiosity by the inspection of the building; whereas, had daylight permitted, we might, at first landing, have proceeded quietly and stopped the covered outlet from the house to the water, and thus secured the inmates, and this only by using the utmost caution in approaching without giving them the wind of us, or making the slightest noise, even the crackling of a dry twig under our feet; so religiously did he believe in their superhuman sagacity in discovering and avoiding danger. Thus assured, I took my gun, more from the influence of the habit of some months of seldom stirring from camp without it, than from any expectation of seeing a beaver. I followed the water to the outlet, while others took the bank; here I stood watching the operations of those above, who had commenced removing the branches of cotton-wood which formed the covering of the domicile. I was startled suddenly by the splashing of the water at my feet, and, looking down, I saw the dusky back of a beaver a few inches under the surface, gliding out into the deep water of the river, and before I could prepare and bring my gun into position, he was out of sight. Nothing could have been easier, had I been prepared, than to have shot him as he thus passed within three feet of the spot on which I stood. Thus, from too much reliance on popular tradition of the unerring instinct of this animal, was I prevented from adding the skin, and description, and measurements of a fresh specimen of the beaver to the trophies of our expedition. As the beaver passed down the stream he was seen to rise for air, abreast of our boat, by some of the men on board. We then proceeded to unroof the house by removing the cotton-wood branches, which covered it for several feet in thickness; they extended for a considerable width on each side, and covered the passage from the house to the water; this passage was about fourteen inches square, as neatly excavated as a ditcher could have made it with a spade; it was from twenty-five to thirty feet long, following the slope of the bank, and ending some two or three feet under the water. The branches were laid with their butts uppermost, and formed a complete thatching to the house, nearly weather-proof. The house itself was a vertical excavation into the bank, cylindrical in form and about three and a half feet in diameter; the slope of the bank, where it was cut, gave it the figure of a section of a cylinder of about four feet high on the side of the bank, and the height of the passage to the river, on the other, about fourteen inches. The bottom and walls of this room were smooth and hard as though they had been pressed or beaten, but not plastered. The circle was apparently perfect in form. I should have said, it was rather more than half-way up the bank. Prevost said that the house was unfinished, and that, before winter, the whole interior earth and brush of the sides and roof would have been neatly plastered with clay so as to render it entirely weather-proof. The quantity of cotton-wood branches and saplings used in this structure was enormous; I suspect the measurement would have been about three cords, or as many wagon loads, and so closely impacted that it was only after considerable labor that a breach was made. On the bank above was the area of *stump-land* where they had felled their timber, taking what was suitable from the most convenient distance. The large block presented this evening was cut from the largest log felled; the branches only were taken, leaving the trunk where it fell. Small saplings were taken entire. The smaller piece, which is cut at both ends, was the butt of a bough or sapling, which, in their attempt to drag to the bank, had become wedged among a clump of bushes in such a manner that they could not

[May,

## EXPLORATIONS UNDER THE WAR DEPARTMENT.

Descriptions of new Species and Genera of Fossils, collected by Dr. F. V. Hayden in Nebraska Territory, under the direction of Lieut. G. K. Warren, U. S. Topographical Engineer; with some remarks on the Tertiary and Cretaceous formations of the north-west, and the parallelism of the latter with those of other portions of the United States and Territories.

BY F. B. MEEK and F. V. HAYDEN, M. D.

(Communicated by permission of the Secretary of War.)

Most of the fossils, and many of the notes and memoranda upon which this paper is based, although collected previous to the presentation of our last communication to the Academy, arrived in the States since that paper was in print. Consequently, we have now not only the means of adding many new and interesting species to the list of ancient mollusca previously known from Nebraska, but the late explorations of Lieut. Warren have also brought to light some additional information in regard to its general geology, which we have embodied in the following remarks.

Before presenting these facts and conclusions, justice to former explorers requires that we should at least give a brief statement of the results of such expeditions as have contributed to the development of the geology of this region.

The first reliable accounts we have of the general physical characters of the upper Missouri country, were given to the world in the report of Lewis and Clark's expedition to the Columbia in 1804-5-6. The explorations of these gentlemen, in addition to bringing out a large amount of information of a different character, established the fact of the occurrence of Cretaceous rocks at the Great Bend of the Missouri below Fort Pierre, and of the existence of what was supposed to be "stone coal" (Lignite,) in the Mandan country. Various beds of clay, sand, sandstone, &c., were mentioned in their report, but without any suggestions respecting their age.

In 1832, the Prince of Neu Wied and party also ascended the Missouri to its sources; and the results of his explorations, embodying a great amount of highly interesting information respecting the geography, natural history, &c., of the country explored, has been published in the form of a large quarto volume, accompanied by a magnificent folio atlas of plates, illustrating the scenery of the country, and the manners and customs of its native tribes, in a style of art rarely equalled on this side of the Atlantic. Respecting the geology of the country, however, the Prince's expedition added little of importance beyond the discovery of *Mosasaurus Missouriensis*, to the results of Lewis and Clark's expedition.\*

Mr. Nicollet, the well known Geographer, visited this country in 1839, ascending the Missouri to Fort Pierre, and making on his way up a fine collection of Cretaceous fossils at the Great Bend.† Although passing rapidly through the country, he formed a tolerably correct idea of its geology, and gave in his report a vertical section of the Cretaceous rock seen below Fort Pierre, which is correct, excepting that he seems to have had no knowledge of No. 2, and as we think, without sufficient reason, represented two of the subdivisions of No. 3 as distinct formations; No. 1 he appears to have referred to the carboniferous system. As he did not go above Fort Pierre, he probably saw nothing of No. 5, though some of its characteristic fossils were presented to him by gentlemen connected with the Fur company.

\* The Prince lost nearly all of his geological specimens by the burning of the Fur Company's steam boat.

† These, together with others given to him at Fort Pierre, were investigated by Dr. Morton, and published in the Jour. Acad. Nat. Sc. Philada., Vol. 8, p. 207.